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Hardware Reference  
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# **IBM Personal Computer AT<sup>®</sup> 512KB/2MB Memory Expansion Option**

**6183310**

**March 18, 1986**



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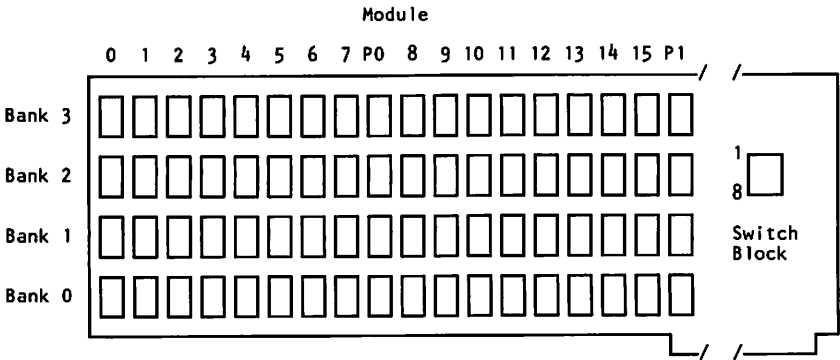
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# Description

The IBM PERSONAL COMPUTER AT® 512KB/2MB Memory Expansion provides 512K of additional random access memory (RAM) and can be expanded to provide a total of 2M of additional RAM.

Four 18-socket banks accept 256K-by-1 dynamic RAM (DRAM) modules. Bank 0 is fully populated. Banks 1, 2, and 3 may be populated by using three IBM Personal Computer AT 512KB Memory Module Kits, consisting of eighteen 256K-by-1 DRAM modules each.



Memory Module Location

# Operating Characteristics

Memory-read (MEMR) and memory-write (MEMW) operations require a 1-wait-state, 3-clock memory cycle. Data moves as a byte (8 data bits and 1 parity bit) or as a word (16 data bits and 2 parity bits) and is parity-checked on the adapter.

## I/O Channel Check

If a parity error is detected, a latch is set and an 'I/O channel check' line is activated; the result is a non-maskable interrupt (NMI) indicating an error to the system unit's microprocessor. The status bits (I/O channel check and system-board parity check) determine the source. Writing to the failing option clears the status bit.

# Memory Address Switches

An eight-switch DIP module is mounted on the memory expansion option. These switches set the starting address for each option above the 1M system board RAM. The switch assignments for the starting address for Bank 0 are as follows:

Switch Number	Switch Assignments	
1	ON:LA23 = 0	OFF:LA23 = 1
2	ON:LA22 = 0	OFF:LA22 = 1
3	ON:LA21 = 0	OFF:LA21 = 1
4	ON:LA20 = 0	OFF:LA20 = 1
5	ON:LA19 = 0	OFF:LA19 = 1
6	Not Used.	
7	Not Used.	
8	Not Used.	

## Switch Assignments

The address of the first expansion memory option must start at address space hex 100000. If additional memory expansion options or IBM Personal Computer AT 512KB Memory Module Kits are installed, no gaps between memory are allowed. All expansion memory must be one contiguous block starting at address hex 100000.

## Notes:

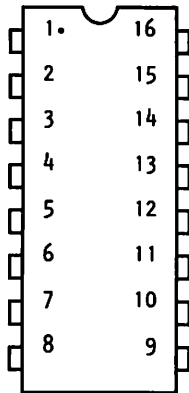
1. An expansion option must be fully populated before another can be installed.
2. In order to determine the total expansion memory installed check bytes hex (30 & 31) in CMOS RAM.

# Programming

Programs that test for memory by writing and reading until a data error is detected, must write back to the failing card to clear possible parity checks. This is required for a partially populated 512KB/2MB Memory Expansion.



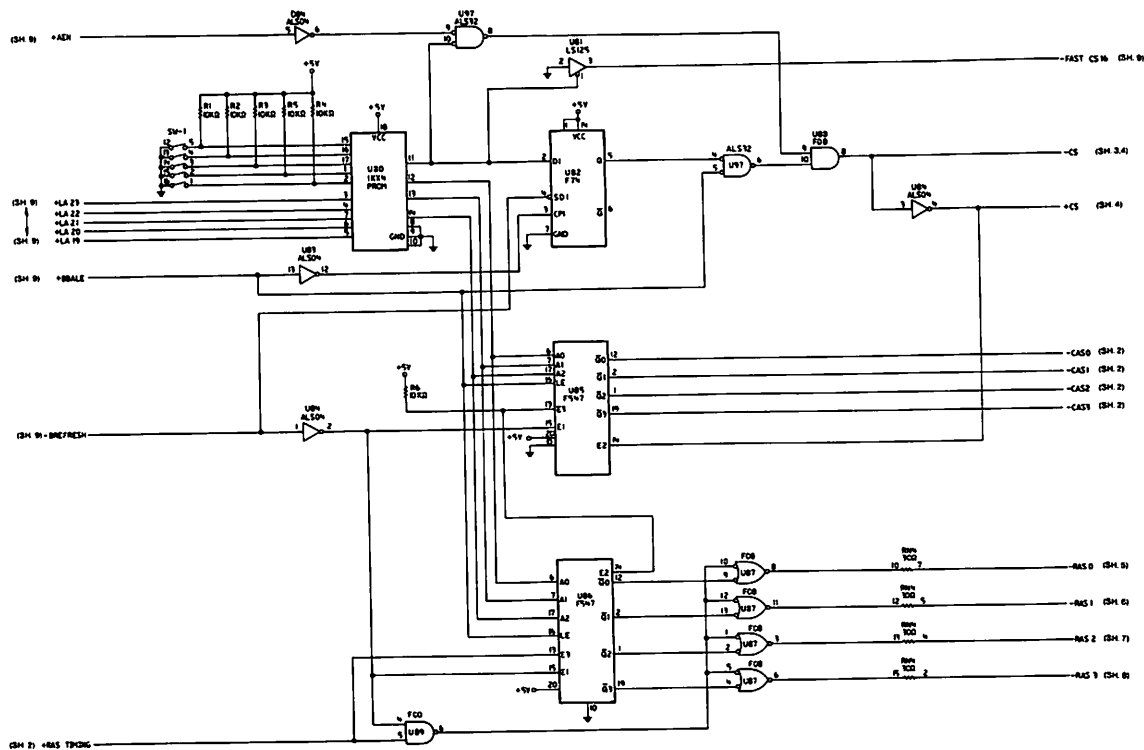
# Specifications



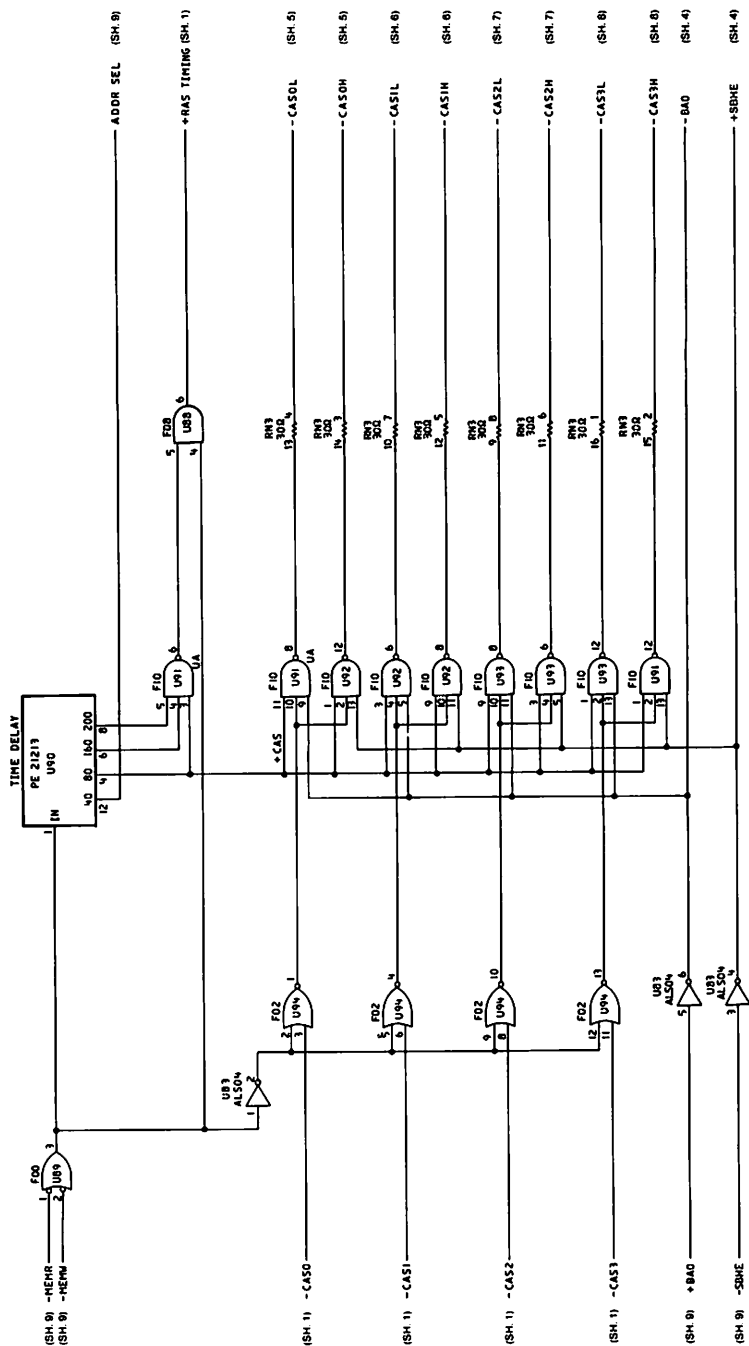
Pin	256 by 1 Bit Module
1	A8
2	Data In *
3	-Write
4	-RAS
5	A0
6	A2
7	A1
8	+5 Vdc
9	A7
10	A5
11	A4
12	A3
13	A6
14	Data Out *
15	-CAS
16	Ground

\* Data In and Data Out are tied together on Data Bits 0-7 (three state bus).

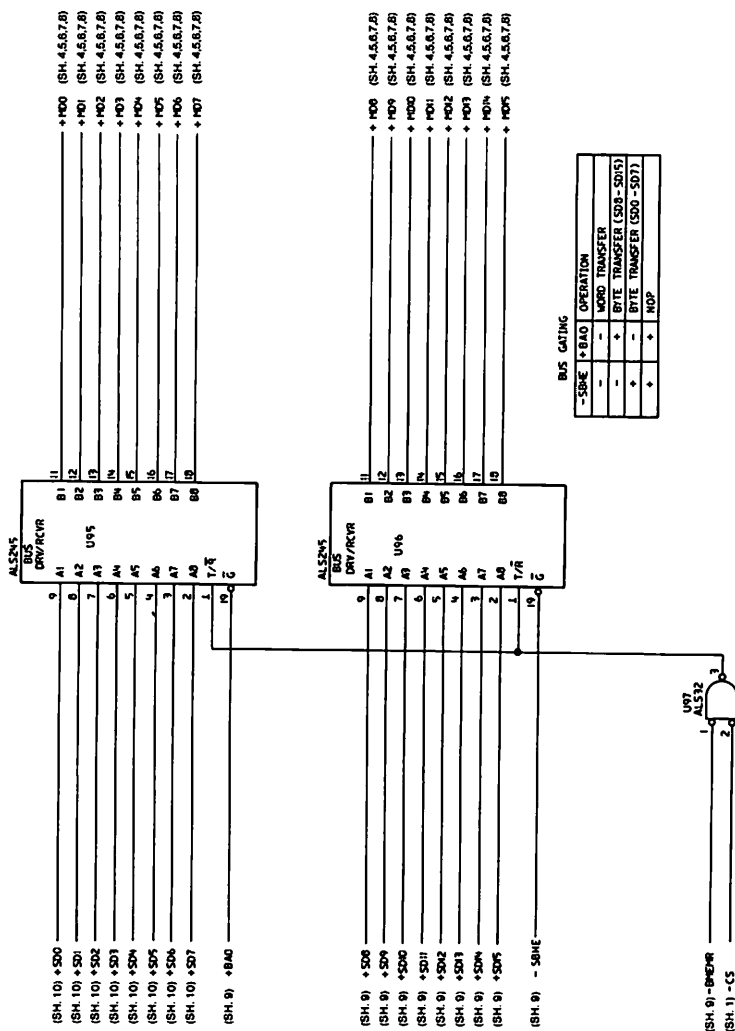
## Memory Module Pin Configuration



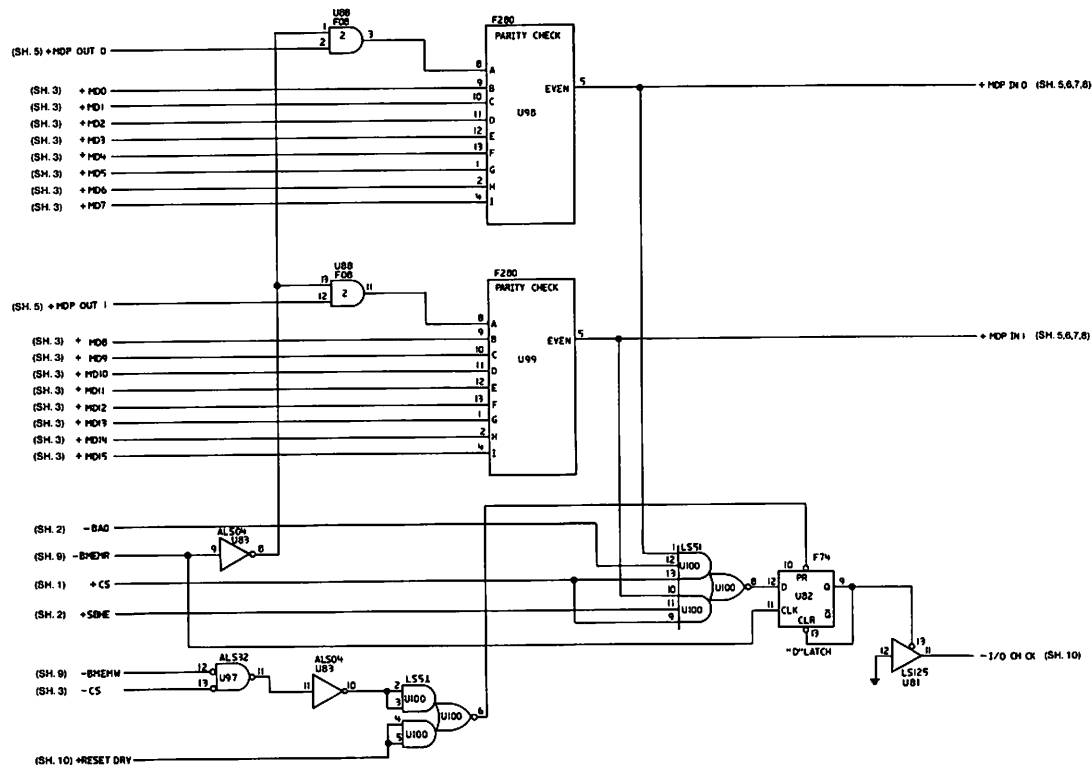
## 512KB/2MB Memory Card (Sheet 1 of 10)



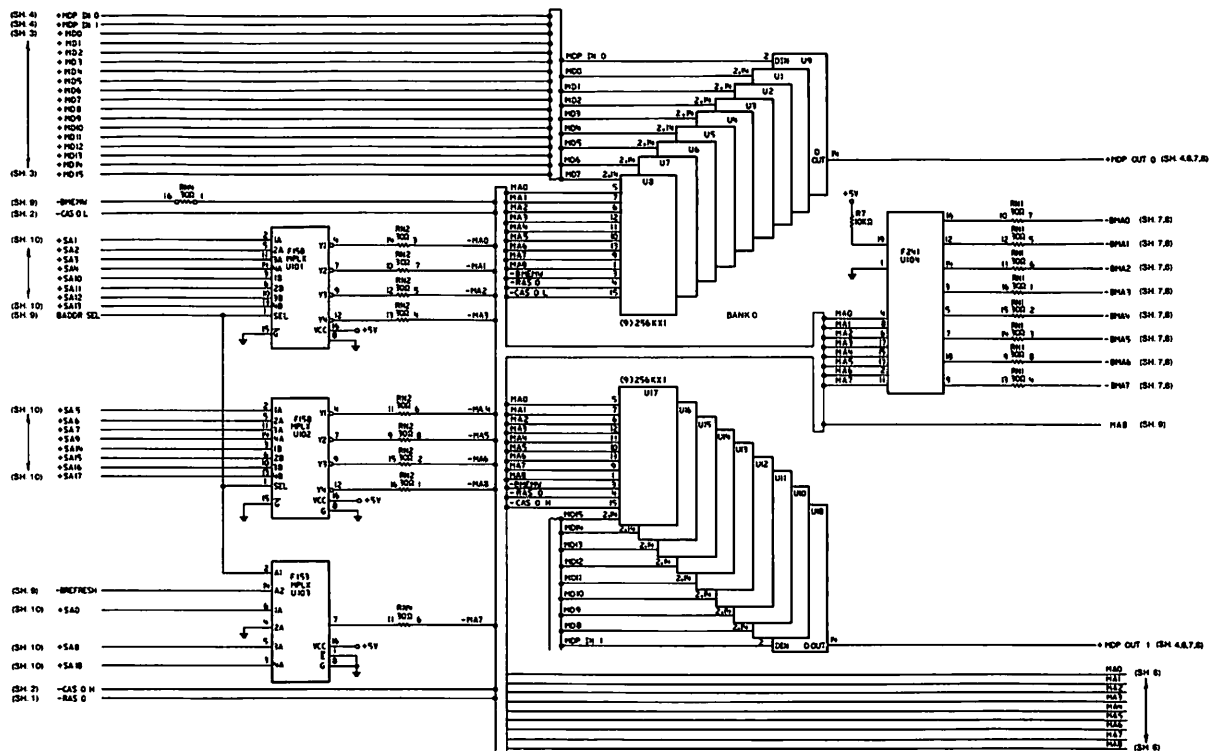
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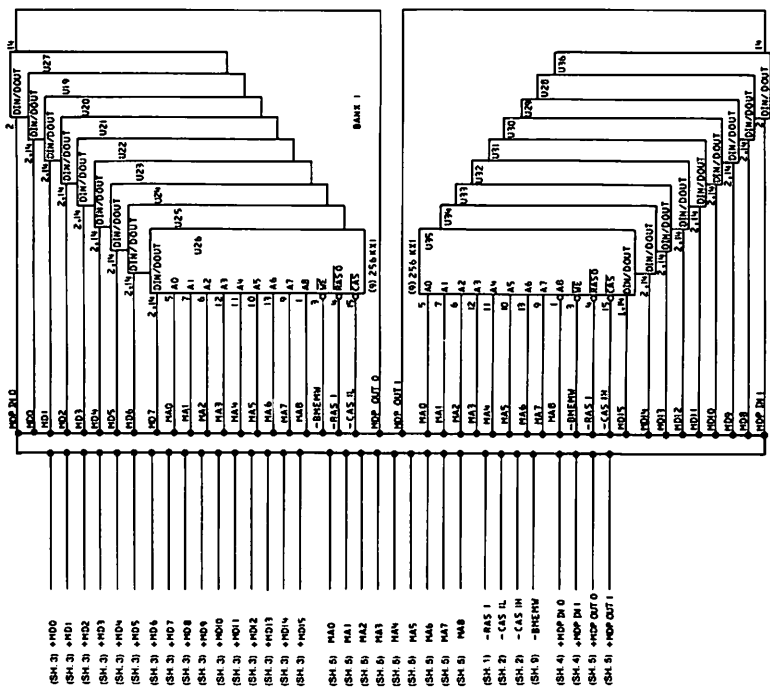
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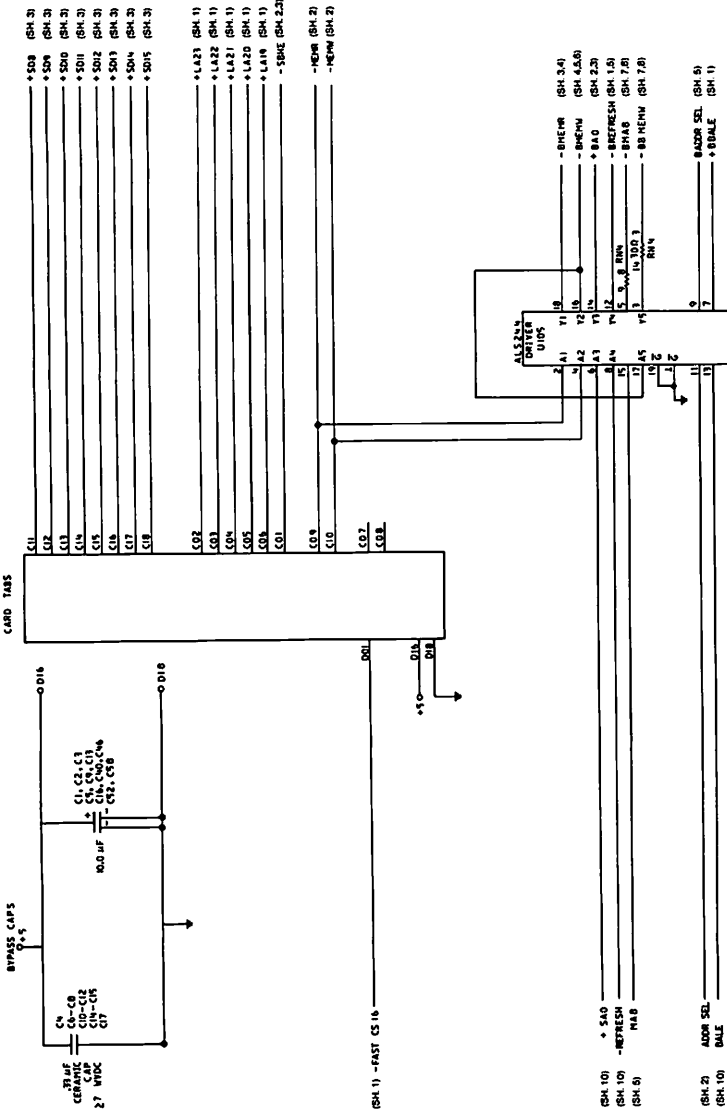


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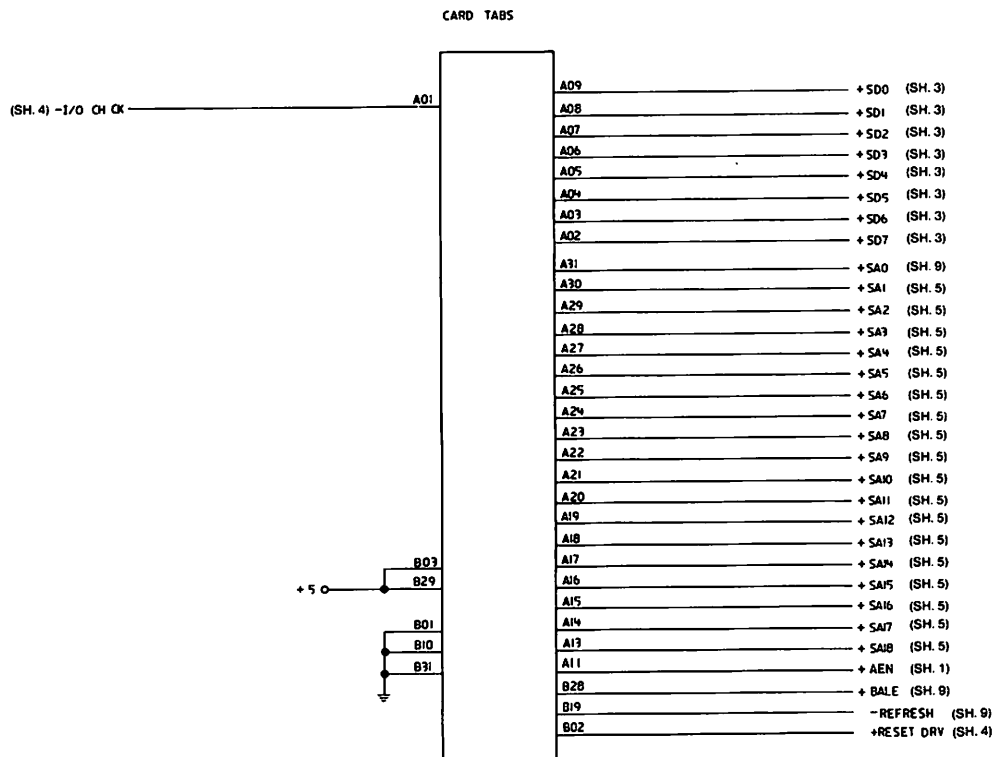








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## Notes: